REMARKS

Paragraphs 1 and 2 of the Office Action deal with issues arising from the restriction requirement. This amendment puts claim 42 in condition for allowance, thus mooting those concerns.

Paragraph 3 points out that the reference to the parent case is missing, and this amendment adds same. The examiner's courtesy in pointing this out is appreciated.

Paragraph 4 relates to form, and this amendment moots those concerns by presenting the claims in proper form.

Paragraph 6 of the Office Action rejected claims 23, 24, 30, 31, 33, 34, 40, and 42 for failing to fully describe the invention in such a way that a person of ordinary skill in the art would be able to practice the invention. The issue of concern was whether or not the finishing composition must contain a flame retardant. Whether or not additional FR material is required in the bath depends on the exact FR test to be passed and the construction of the fabric, especially the overall weight. There are more than one version of FR test. The NFPA 701 small scale test has changed from the 1989 version to the 2004 version. While claim 23 is specific to the 1996 version of the NFPA test, the broadest claims are not. The criticality of the FR additive thus can vary, but the additive is not critical for the invention in its broadest embodiments. Thus, those portions of the specification that the examiner indicated required the flame retardant have been amended to indicate that flame retardant is not required. Since the specification has now been clarified, this rejection and the rejections (i.e. paragraphs 9 and 11(a)) predicated on it should be withdrawn.

In paragraph 7 the Office Action rejected claims 23, 24, 30, 31, 33, 34, 40, and 42 under section 112 first paragraph on the basis of statements in Table 1. Table 1 has been amended to

clarify the terminology for the convenience of the examiner and subsequent readers. Those of ordinary skill in the textile art already understood the terminology originally used, since this was very common in the textile art. The yarn characteristics, for example, are even set forth in much the same fashion on Avora's own website, a copy of which is attached.

Paragraph 8 of the Office Action rejected claims 23, 24, 30, 31, 33, 34, 40, and 42 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as his invention. The claims now specify the fabric is made of polyester, overcoming the concern stated in the rejection.

Paragraph 11(b) raises the question of the recitationg of the addition of a fluorochemical. The addition of a fluorochemical is non-obvious in view of the conventional wisdom of the inherently FR manufacturers that fluorochemicals are to be avoided, as set forth at page 2, line 14 of the specification. The examiner's suggestion in paragraph 11(c) had been adopted. As to paragraph 11(d), the examiner's assumption is correct.

Paragraph 11(e) says the use of Trevira CS in the claim is indefinite. In the textile industry terms like Trevira CS are used commonly to convey a fiber with certain characteristics. The claim has been amended to attempt to address the examiner's concerns; the reality is that those of ordinary skill in the art would much more readily refer to the fiber as Trevira CS than polyester fibers incorporating organic phosphorous compounds.

Paragraph 12 expressed concern about trademarks in the specification. The specification has been amended to comply.

Paragraphs 13-14 of the Office Action objected to the drawings for various inconsistencies. Since this is application is directed to a method, no drawings are needed (see

MPEP Section 601.01(f) eighth edition), so the drawings and references to them have been cancelled.

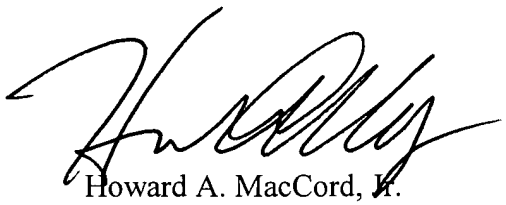
Paragraphs 16, 17, 20, 21, and 22 of the Office Action rejected claim 42 and various claims dependent on claim 42 as being anticipated by or obvious from U.S. Patent No. 4,526,830 to Ferziger et al. and U. S. Patent No. 4,690,859 to Porter et al. Ferziger et al. and Porter et al. each disclose a fiberglass fabric. Claim 42 now recites that the fiber is polyester, which these references neither disclose nor suggest. Thus these rejections and the rejections of the claims dependent on claim 42 based on the Ferziger and Porter references should be withdrawn.

In paragraphs 18, 23, and 24 claims 42, 23, and 40 were rejected as being anticipated by JP 07-157977. The Office Action rejected claims 24, 30-31, and 33-34 as being unpatentable over JP 07-157977 in view of White. The Office Action only provided a copy of an abstract of this Japanese patent. Applicant obtained and encloses a copy of a translation of the Japanese patent publication. The '977 patent teaches a three step process: 1. applying a water repellant fluoropolymer to one side of a fabric made of a fire-resistant polyester (Trevira CS) 2. drying and 3. applying an FR agent to the other side. Paragraphs 13 and 19 of the '977 describe the possibility of applying the fluorine containing water repellant to the inherently FR Polyester fabric by immersion, followed by wringing with a mangle.

Claim 42 specifies a method of finishing an inherently flame resistant fabric comprising forming a fabric of inherently flame resistant polyester fibers, saturating the fabric with a composition containing a fluorochemical and one or more of an antimicrobial agent, a flame retardant, a fluid repellant agent and a soil repellant agent, and drying the fabric. Thus, applicant is applying the agents in one step, rather than the two steps of the reference. Also applicant's composition includes a fluorochemical and one or more of several members of a Markush group. The '977 patent only uses an organic fluoropolymer water repellent in its first step. Moreover, the

'977 is coating the fabric, not saturating it as claimed. Thus the broadest claim distinguishes over the '977 reference, so the rejections based on the '977 reference should be withdrawn.

Respectfully submitted,



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Date: November 23, 2005
File No.: 2250-13A

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Christian E. Carter-Seyboth
Name of Depositor

Signature

November 23, 2005
Date of Signature

PRODUCTS - INVISTA inherent FR fibers and yarns, which are used to produce Avora® FR fabrics, are available in a range of yarns: as POY, flat and textured yarns.

	Type #	Denier	Luster	Cross Section
Avora FR				
POY Filament	H90	120/70/34	Semi-dull	Round
		262/150/34	Semi-dull	Round
		263/150/66	Semi-dull	Round
		260/150/100	Semi-dull	Round
Textured Filament	T90	1/150/34	Semi-dull	Round
		2/150/34	Semi-dull	Round
		1/150/66	Semi-dull	Round
		2/150/66	Semi-dull	Round
	TJ0	1/150/68	Semi-dull	Round Cationic Dyeable
Flat Filament	EE3	1/70/48	Bright	Trilobal
Staple	T271	1.5 x 1.5"	OB SD	Round
Avora Plus FR				
Textured Filament	TC0	1/150/68	Semi-dull	Round
		2/150/68	Semi-dull	Round
		1/150/96	Semi-dull	Round
Staple	T270	1.5" x 1.5"	OB SD	Round

AVORA® FR

SITE MAP

(19) JAPANESE PATENT OFFICE (JP)

(11) Japanese Laid-Open Patent Application (Kokai) No. H07-157977

(12) Official Gazette for Laid-Open Patent Applications (A)

(51)Int. Cl.[6]	Class. Symbols	JPO File Nos.	F1	Tech. Indic.
D06M	15/564 15/576			
// D06M	101:32			
			D06M 15/564 15/576	

(43) Disclosure Date: June 20, 1995

Request for Examination: Not yet submitted Number of Claims: 2

OL (Total of 4 pages [in original])

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(22) Filing Date: December 2, 1993

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(54) **[Title of the Invention]** **Flame-Retardant, Waterproof Canvas**

(57) **[Abstract]**

[Object] The object of the present invention is to provide a flame-retardant, waterproof canvas that has excellent flame retardancy, water resistance, and water repellency, is easy to handle, and has good texture.

[Structure] A flame-retardant, waterproof canvas, characterized in that an organic fluoropolymer water repellant is applied to the front surface of cloth made from noncombustible polyester fibers, the back surface is coated with a mixed resin of a thermofusible polyurethane resin and a halogenated urethane compound, and the weight ratio of this mixed resin is 90:10 to 30:70.

[Claims]

[Claim 1] A flame-retardant, waterproof canvas, characterized in that an organic fluoropolymer water repellant is applied to the front surface of cloth made from noncombustible polyester fibers, the back surface is coated with a mixed resin of a thermofusible polyurethane resin and a halogenated urethane compound, and the weight ratio of this mixed resin is 90:10 to 30:70.

[Claim 2] The flame-retardant, waterproof canvas according to claim 1, wherein the amount of mixed resin coating is 20 to 70 g/m^2 in terms of solid content.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention] The present invention relates to a flame-retardant, waterproof cloth that is widely used in eave tents [*Tr's note*: *a type of awning used in Japan*] and other lightweight canvases.

[0002]

[Prior Art] Polyester fibers are characterized in being very strong, having a low modulus, being hydrophobic and therefore showing little increase in weight and dimensional change when wet, being easy to handle, and the like. They are therefore widely used in eave tents and other lightweight canvases. However, they are flammable and there is therefore a strong demand for flame-retardant polyester fibers from the aspect of safety against fire, and the like.

[0003]

Examples of conventional methods for fireproofing coated cloth made of polyester fibers are methods whereby a halogenated phosphoric acid ester flame-retardant is applied and then the product is coated with a mixed resin of polyurethane resin and halogenated phosphoric acid ester (JP (Kokai) S51-11300) or then the product is coated with a mixed resin of vinyl chloride resin and antimony trioxide (JP (Kokoku) S46-19756). In the former case the cloth is treated with an oily halogenated phosphoric acid ester; therefore, there is a disadvantage in that the coated surface becomes tacky (sticky), dirt very easily adheres to the surface, and abrasion durability is poor. In the latter case, it is necessary to apply resin in an amount that is at least 50 wt% with respect to the base cloth in order to realize flame retardancy, the texture of the product is coarse and hard, and the product is difficult to handle; therefore, it cannot be used for eave tents and other lightweight tents.

[0004]

As a result of conducting intense studies in order to obtain eave tents and other canvases made from polyester fibers that are flame-retardant, waterproof, and water-repellant, are easy to handle, and have a good texture, the inventors completed the present invention upon discovering that a flame-retardant, waterproof canvas that has excellent flame retardancy, water resistance, and water repellency, is easy to handle, and has a good texture is obtained by applying an organic fluoropolymer water repellant to cloth made from polyester fibers the polymer material of which in itself is noncombustible, and

then coating the back surface with a mixed resin obtained by mixing a thermofusible polyurethane resin and halogenated urethane compound at a mixture ratio within a range of 90:10 to 30:70.

[0005]

[Object of the Invention] The object of the present invention is to provide a flame-retardant, waterproof canvas that has excellent flame retardancy, water resistance, and water repellency, is easy to handle, and has a good texture.

[0006]

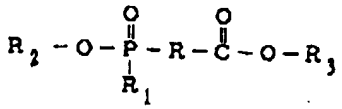
[Structure of the Invention] The present invention is "a flame-retardant, waterproof canvas, characterized in that an organic fluoropolymer water repellant is applied to the front surface of cloth made from noncombustible polyester fibers, the back surface is coated with a mixed resin of a thermofusible polyurethane resin and a halogenated urethane compound, and the weight ratio of this mixed resin is 90:10 to 30:70 (claim 1) and the flame-retardant, waterproof canvas according to claim 1, wherein the amount of mixed resin coating is 20 to 70 g/m^2 in terms of solid content (claim 2)."

[0007]

The noncombustible polyester fibers of the present invention have ethylene terephthalate as the primary structural unit, and are obtained by copolymerization of the phosphorus compound represented by the following general formula (chemical formula 1) or the general formula (chemical formula 2) in an amount that is 0.3 to 1.0 wt% as phosphorus element.

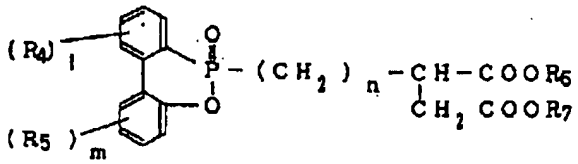
[0008]

[chemical formula 1]



[0009]

[chemical formula 2]



[0010]

(R is a saturated chain or cyclic alkylene, arylene, or aralkylene residue and R_1 is an alkyl group, aryl group, or aralkyl group having one to six carbons. R and R_1 optionally contain hetero atoms, particularly F, Cl, Br, O or S. R_2 and R_3 are alkyl or aryl groups with 1 to 18 carbons, or hydrogen atoms. R_4 and R_5 can be the same or different and are a hydrogen atom, halogen atom, or hydrocarbon group with six carbons or less. R_6 and R_7 can be the same or different, and are a hydrogen atom, a hydrocarbon group

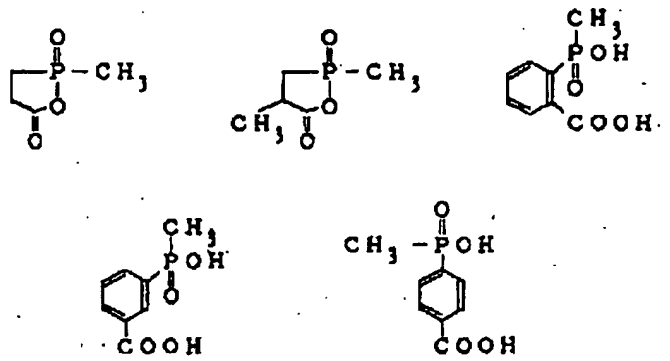
with 7 carbons or less, or a group represented by $(-R_8O)_r$. R_8 is an ethylene group, propylene group, or butylene group, r is an integer of 1 to 10, l and m are 0 or an integer of 1 to 10, and n is 0, 1, or 2).

[0011]

Specific examples of phosphorus compounds represented by the above-mentioned general formulas are the following cyclic anhydrides of 2-carboxyethylmethylphosphinic acid (chemical formula 3).

[0012]

[chemical formula 3]



[0013]

The organic fluoropolymer water repellent is a perfluoroalkyl or polyfluoroalkyl group-containing (meth)acrylate homopolymer or copolymer with a vinyl ester, vinyl ether, or acrylamide, or a perfluoroalkyl or polyfluoroalkyl group-containing urethane compound water repellent, but a urethane fluorine water repellent with good thermofusion properties is particularly preferred. Application of the fluorine water repellent to the cloth can be accomplished by spraying, immersion, roller application, and the like. The amount applied is preferably 0.01 to 0.15 wt% in terms of fluorine element. 0.015 to 0.08 wt% is particularly preferred. If too much is applied, adhesion of the resin and flame retardancy will be poor, while if too little is applied, resin film moldability will be poor and water resistance will be poor.

[0014]

The thermofusible polyurethane resin is any copolymer of a polyether or polyester and polyurethane that is a single liquid-type linear polymer without crosslinked bonds. The halogenated urethane compound is an isocyanate terminal-containing prepolymer (intermediate) obtained by reacting excess moles of an organic diisocyanate with a halogenated polyether glycol or polyester glycol having terminal hydroxyl groups.

[0015]

The term cloth means a woven, knit, moquette, and the like. The mixture ratio of thermofusible polyurethane resin and halogenated urethane compound must be within a range of 90:10 to 30:70 by weight ratio. If the percentage of urethane resin is more than this range, flame retardancy will be poor, while if it is less, film strength will be weak and

water resistance will be poor. Moreover, a conventional benzotriazole, benzophenone, or other UV absorber can also be used to improve light resistance of the coating agent.

[0016]

The amount of resin applied is preferably within a range of 20 to 70 g/m^2 in terms of solid content. If it is less than 20 g/m^2, water resistance will be insufficient, while if it exceeds 70 g/m^2, texture will be hard and the product will be difficult to handle. The resin is diluted with dimethylformamide, toluene, or another solvent, and viscosity is adjusted to 3.000 to 30.000 cps. If viscosity is too low, film moldability will be poor and water resistance will be poor because the resin will penetrate the cloth. A viscosity that is too high is a problem in that a resin film will form on the cloth surface, the cloth surface will tend to become tacky, there will be a reduction in adhesion between the cloth and the resin, and resin will peel off the cloth during use. Examples of the coating method are knife coating, kiss rolling, and gravure coating. Drying after application is performed for 30 seconds to five minutes at 100 to 170°C.

[0017]

[Effect of the Invention] A flame-retardant, waterproof cloth that has excellent fire resistance, water resistance, and water repellency, is easy to handle, and has a good texture is obtained by the present invention.

[0018]

The method for producing the flame-retardant, waterproof canvas of the present invention will now be described with working examples. The parts in the working examples are all wt%. The properties were evaluated by the following methods:

Flame retardancy	Fire Service Law 45° microburner and coil methods
Water resistance	JIS L1092-1977 water pressure resistance method
Water repellency	JIS L1092-1977 spray method
Tackiness	Sensory testing by touch to check for stickiness
Amount of coating	Calculated from change in weight before and after coating

[0019]

[Working Examples 1 through 3] A plain woven having a warp density of 55 threads/inch, a filling yarn density of 44 threads/inch, and a basis weight of 260 g/m^2 that was made from noncombustible polyester fibers (Teijin Ltd., Trevira CS: 20/2) with a phosphorus content of 0.6% using a warp thread and filling thread that had been denatured with carboxyphosphinic acid was immersed in the organic fluoropolymer water repellent in Table 1, wrung with a mangle (wringing rate of 60%), dried for five minutes at 129°C, and heat set for 30 seconds at 170°C. Then the treated cloth was uniformly coated by knife coating with the coating agent in Table 1 and dried for two minutes at 130°C. The amount of coating was always 45 g/m^2. The properties of the finished cloth are shown in Table 1.

[0020]

[Comparative Example 1] Exactly the same treatment as in Working Example 1 was performed with the exception that the flame retardant in Working Example 1 was changed to cresyl diphenyl phosphate (CDP). The results are shown in Table 1.

[0021]

[Comparative Example 2] Exactly the same treatment as in Working Example 1 was performed with the exception that regular polyester was used in place of the nonflammable polyester in Working Example 1. The results are shown in Table 1.

[0022]

[Table 1]

		Working Example 1	Working Example 2	Working Example 3	Comparative Example 1	Comparative Example 2
Water repellent	TKS 115	0.5	0.5	0.5		0.5
	AG-710				0.5	
	Amount of fluorine (% owf)	0.015	0.015	0.015	0.015	0.015
Mixed resin	NY-331	100 (50)	100 (80)	50 (30)	100 (50)	100 (50)
	P-300	42 (50)	10 (20)	50 (70)		42 (50)
	CDP				25 (50)	
Fireproofing	Method A	0	2	0	3	35
	Method B	4	3	5	3	2
	Evaluation	O	O	O	O	X

[0023]

[Table 2] Continuation of Table 1

	Working Example 1	Working Example 2	Working Example 3	Comparative Example 1	Comparative Example 2
Water resistance (mm)	1200	1500 or greater	800	500	1200
Water repellency (points)	80	80	80	80	80
Tackiness	Minimal	Minimal	Moderate	Extreme	Minimal

TKS115: Fluorinated urethane water repellent made by Takamatsu Oil and Fat Co., Ltd. (fluorine content of approximately 5%; analytical estimate by combustion flask method)

AG-710: Fluorinated acrylate water repellent (fluorine content of approximately 5%) made by Meisei Chemical Works, Ltd.

NY-331: Polycarbonate urethane resin made by Dainippon Ink and Chemicals Incorporated

P-300: Halogenated urethane oligomer flame retardant made by Dainippon Ink and Chemicals Incorporated

CDP: abbreviation for cresyl diphenyl phosphate (oily flame retardant)

Method A (microburner method): shows afterglow (seconds) in three-second ignition tests (three seconds or less passes the test)

Method B (coil method): shows the number of times flame was applied (three or more times passes the test)

( ): [The figures in parentheses are] the solid content ratio.